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Environmental Monitoring
Systems Laboratory
P.O. Box 93478
Las Vegas, NV 89193-3478

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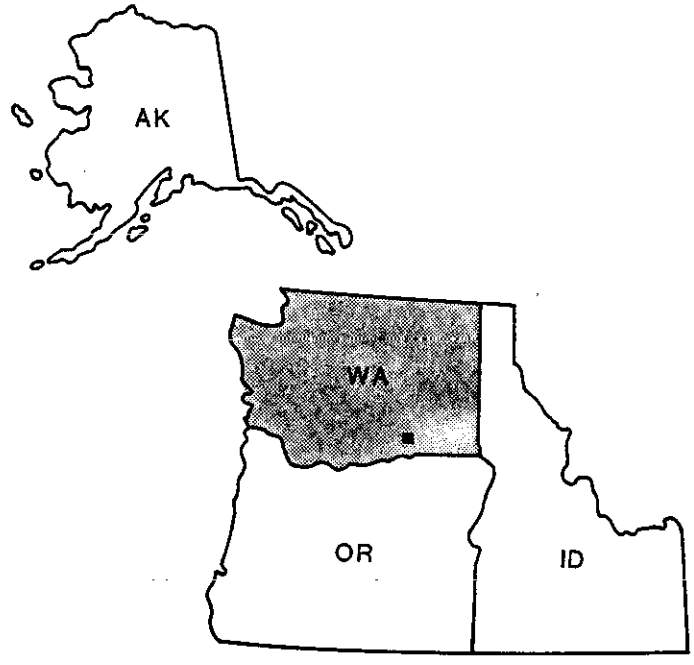
March 1989

Research and Development

EPA

AERIAL PHOTOGRAPHIC ANALYSIS OF ROCKWELL HANFORD OPERATIONS AREA 100H Richland, Washington

EPA Region 10



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AERIAL PHOTOGRAPHIC ANALYSIS OF ROCKWELL HANFORD OPERATIONS AREA 100H

Richland, Washington

by

W. M. Mack
Environmental Programs
Lockheed Engineering and Sciences Company
Las Vegas, Nevada 89193-3478

Contract No. 68-03-3245

Project Officer

C. E. Lake
Advanced Monitoring Systems Division
Environmental Monitoring Systems Laboratory
Las Vegas, Nevada 89193-3478

ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
LAS VEGAS, NEVADA 89193-3478

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ABSTRACT

This report presents the results of an archival aerial photographic analysis of the Department of Energy, Rockwell Hanford Operations Area 100H located approximately 40 miles north of Richland, Washington, spanning a 35-year period (1948 - 1982). The Area 100H study site covers approximately 370 acres along the south bank of the Columbia River. It is served by roadways, railroads, electric power lines, probably pipelines, and has a probable cooling water intake pumping station on the river. The site has several waste burial pits and trenches.

The 1948 photography showed the study site undergoing construction, ground scarring from roadway and railroad construction was wide spread. The fence secured facility appeared operational by 1964 and consisted of several processing buildings and separated waste disposal locations. By 1973 disassembly of the facility was underway, several buildings had been removed and lagoons emptied. The 1976 photo revealed continued dismantling, and the facility appeared closed and deserted by 1982 with one large building remaining.

The U.S Environmental Protection Agency's Environmental Monitoring Systems Laboratory in Las Vegas, Nevada prepared this report for the Agency's Environmental Services Division in Region 10 at Seattle, Washington and the Office of Emergency and Remedial Response in Washington D.C.

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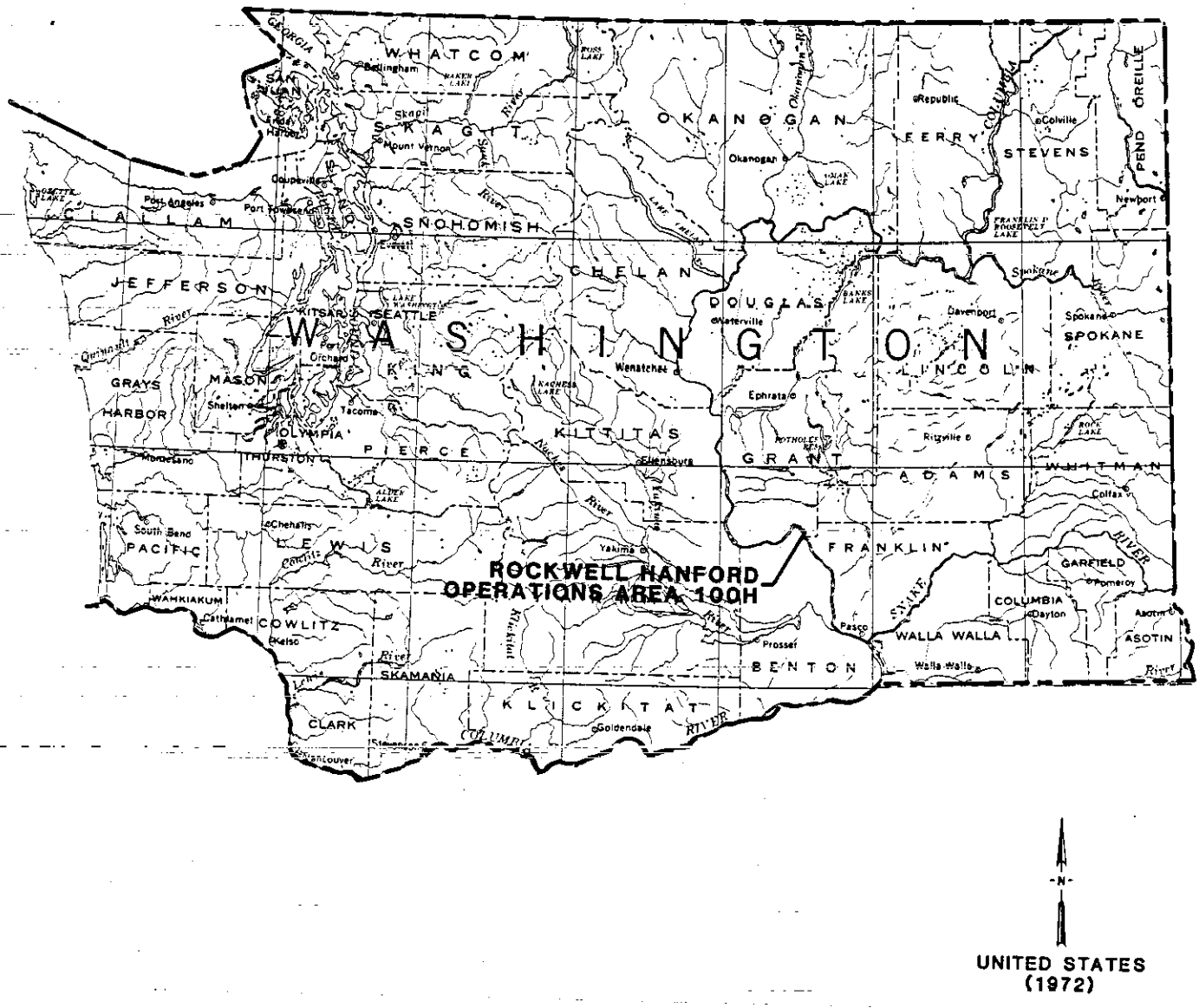


Figure 1. Site location map, Washington. Scale 1:2,500,000.

INTRODUCTION

This report presents the results of an archival aerial photographic analysis of the Department of Energy, Rockwell Hanford Operations Area 100H located approximately 40 miles north of Richland, Washington (Figure 1). The nuclear weapons production related facility consists of several, separated operations and processing areas of which Area 100H is a member. The Area 100H facility covers approximately 370 acres.

Five selected dates of photo coverage of this site were available. The photos span a 35-year period (1948 - 1982) and are the primary source data for the report. The Rockwell Hanford Operations Area 100H site is under study by the U.S. Environmental Protection Agency's Region 10 Office for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This report addresses visible disposal activities and/or potential environmentally hazardous conditions over time. The analysis will assist in field investigations and potential enforcement actions.

This study site has been previously covered in the Las Vegas laboratory report: "Aerial Photographic Analysis of Two Industrial Facilities in Southern Washington, Hanford and Longview, Washington, TS-AMD-86608-3" which used photo coverage acquired on 3-2-86.

Topics addressed in this report include surface water contamination, indications of leachate, drainage patterns, disposal and/or burial of solid, liquid, and/or sludge waste, and visible vegetation stress associated with facility operations.

The U.S. Environmental Protection Agency's Environmental Monitoring Systems Laboratory in Las Vegas, Nevada prepared this report for the Agency's Environmental Services Division in Region 10 at Seattle, Washington and the Office of Emergency and Remedial Response in Washington D.C.

METHODOLOGY

Stereoscopic pairs of historical aerial photographs are used to perform the analysis. Stereo viewing enhances the interpretation because it allows the analyst to observe the vertical as well as horizontal spatial relationships of natural and cultural features. Stereoscopy is also an aid in distinguishing between various shapes, tones, textures, and colors that can be found within the study area.

Evidence of waste burial is a prime consideration when conducting a hazardous waste analysis. Leachate or seepage resulting from burial and dumping of hazardous materials might threaten existing surface or ground-water sources. Pools of unexplained liquid are routinely noted because they can indicate seepage from buried wastes that may enter drainage channels and allow contaminants to move off the site. An excellent indicator of how well hazardous materials are being handled at a site is the presence or absence of spills, spill stains, and vegetation damage. Trees and other forms of vegetation that exhibit a marked color difference from surrounding members of the same species are labeled "dead," "stressed," or "damaged" based upon the degree of noticeable variation. Vegetation is so labeled only after consideration of the season in which the photographs were acquired.

The U.S. Environmental Protection Agency's Statement of Procedures on Floodplain Management and Wetlands Protection (Executive Orders 11988 and 11990, respectively) requires EPA to determine if removal or remedial actions at hazardous waste sites will affect wetlands or floodplains and to avoid or minimize adverse impacts on those areas. To aid in compliance with these orders, significant wetland areas located within and adjacent to the sites have been identified and delineated. However, the sites have not been visited to verify the accuracy of wetland identification.

Drainage analysis determines the direction a spill or surface runoff would follow. Direction of drainage is determined from analysis of the photographs and from U.S. Geological Survey topographic maps. Whenever they are available, 7.5-minute quadrangle maps (scale 1:24,000) are used to show site location and to provide geographic and topographic information.

Results of the analysis are shown on annotated overlays attached to the photos. The following table provides documentation of the photographs used in this report:

TABLE 1. DOCUMENTATION OF AERIAL PHOTOGRAPHY

Site name, location, and geographic coordinates	Figures	Date of acquisition	Original scale	Film type†	Photo source#	Photo I.D.	Frame
Rockwell Hanford	3	05-25-48	1:27,000	B&W	EROS	XB	3-53
Operations	4	05-25-48	1:27,000	B&W	EROS	XB	2-150
Area 100H	5	11-02-64	1:20,000	B&W	EROS	VBBK	788
Richland, WA	6	08-1973	1:24,000	B&W	COESEA	573	125-16
46°42'05"N	7	08-1976	1:24,000	B&W	COESEA	576	125-3
119°28'55"W	8	06-16-82	1:24,000	CC	EROS	VFEKC	1-206

†Film type identification:
B&W: Black-and-White Panchromatic
CC: Conventional Color

#Photo source identification:
EROS: U.S. Department of the Interior, Geological Survey, Earth Resources Observation Systems Data center, Sioux Falls, South Dakota.

COESEA: CORPS of Engineers, Survey Branch Seattle District, South Seattle, Washington.

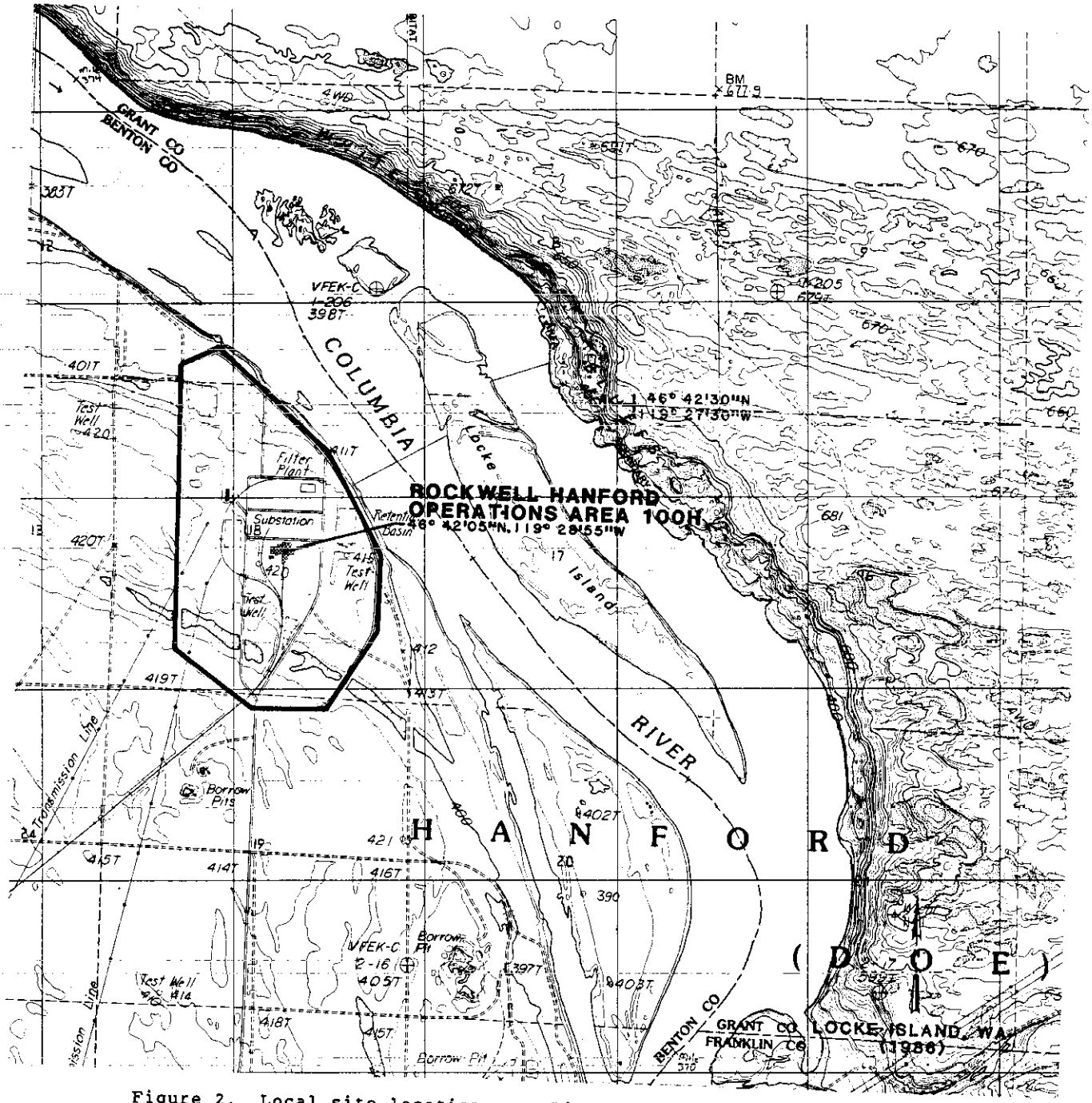


Figure 2. Local site location map, Richland, Washington. Scale 1:24,000.

ANALYSIS SUMMARY

The Rockwell Hanford Operations Area 100H covers approximately 370 acres and is a nuclear weapons production related facility. Black-and-white and color photos from 1948, 1964, 1973, 1976, and 1982 were used in the analysis.

The 1948 photograph showed the study site undergoing construction, ground scarring form roadway and railroad construction was wide spread. The fence secured facility appeared operational by 1964 and consisted of several processing buildings and separated waste disposal locations. By 1973 disassembly of the facility was underway, several buildings had been removed and lagoons emptied. The 1976 photo revealed continued dismantling, and the facility appeared closed and deserted by 1982 with one large building remaining.

The Rockwell Hanford Operations Area 100H is located along the south side of the Columbia River and has a probable cooling water intake pumping station. Regional surface runoff flows into the river, runoff from the study site does so also. The facility is vulnerable to 100-year flood event of the adjacent Columbia River due to its close proximity.

PHOTO ANALYSIS

MAY 25, 1948

The 1948 photographs (Figure 3 and 4) show the extreme north and southern portions of the Department of Energy, Rockwell Hanford Operations Area 100H study site; complete photo coverage of the study area for this year was not available. The entire site appears under construction. The widespread ground scars are a result of earthmoving activity to clear and level areas prior to erection of buildings and construction of roadway and railroad beds.

One large pit (Figure 3, Annotation A) in the west portion of the site appears to be associated with waste disposal activity because of its proximity to two apparent trenches. Another pit (Figure 4, Annotation B) at the northern portion of the site also appears to related to waste disposal due to its isolation. A third pit (Annotation C) is adjacent to a center of construction and its purpose is unknown.

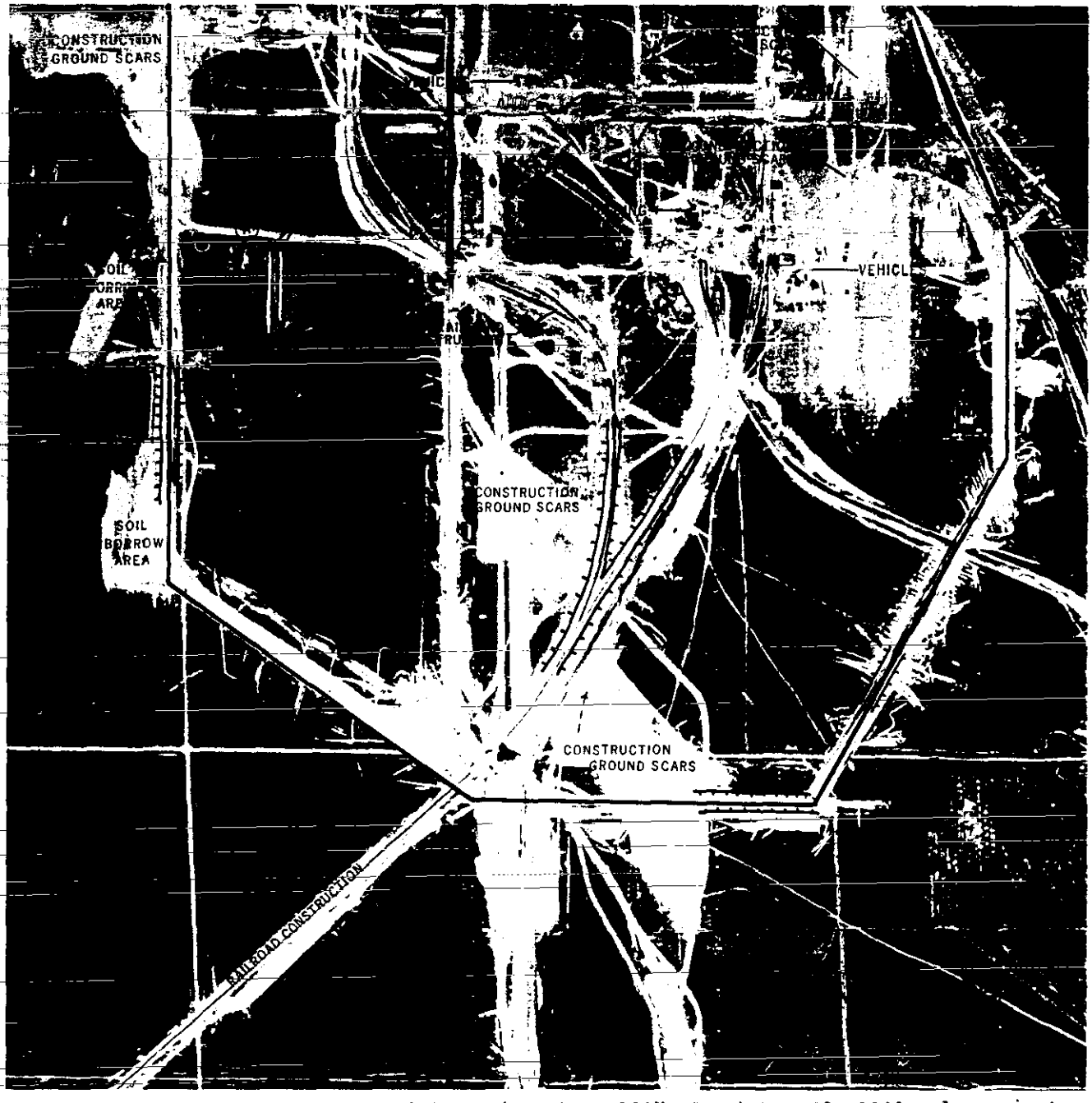


Figure 3. Rockwell Hanford Operations Area 100H, South May 25, 1948. Approximate scale 1:11,000.

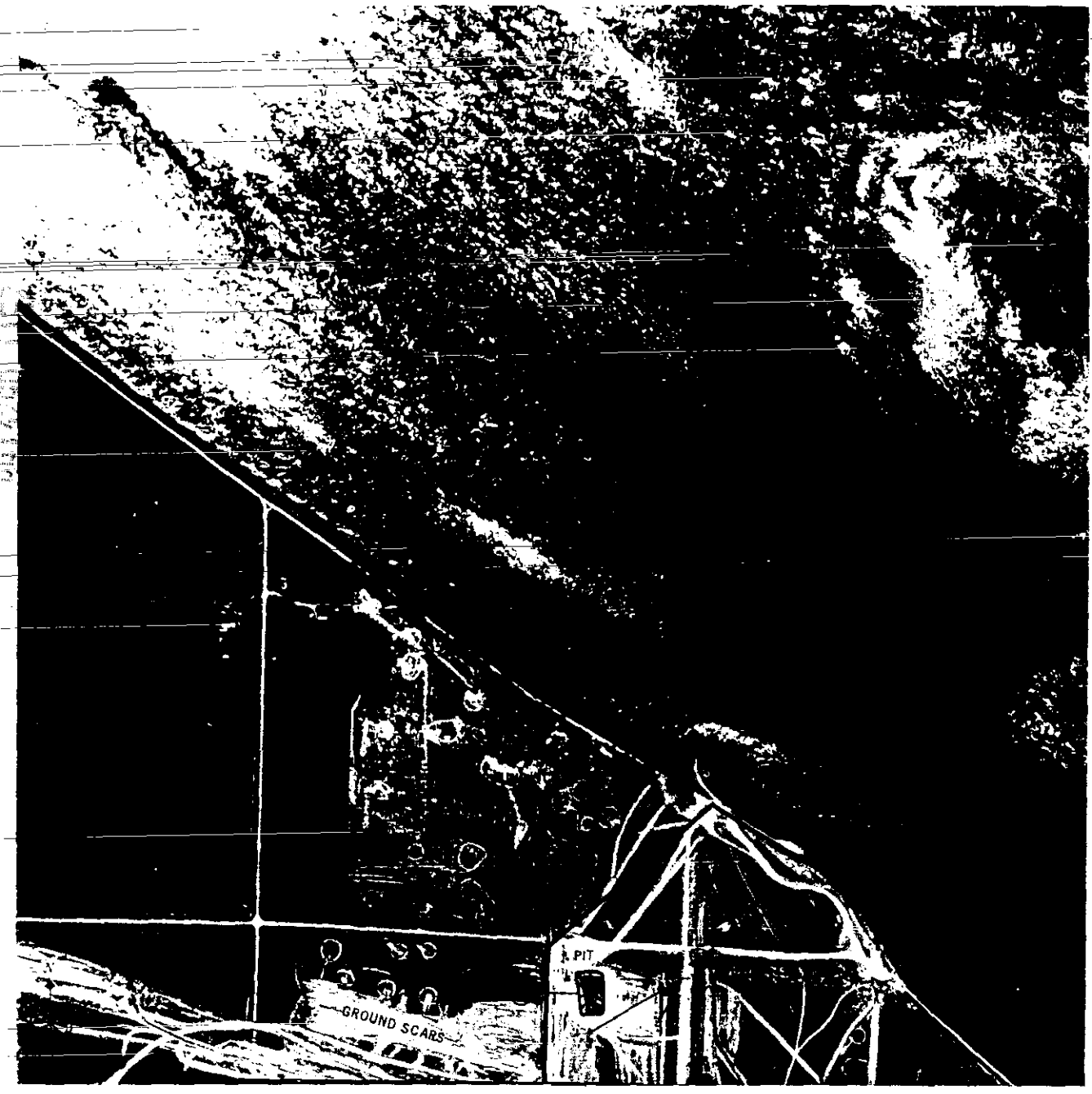
NOVEMBER 2, 1964

The 1964 photograph (Figure 5) shows the fence secured Rockwell Hanford Operations Area 100H is completed. Several vehicles are observed throughout the compound and in parking lots. Area 100H is served by road, railroad, electric power transmission lines, and a probable buried pipeline. The facility consists of several processing buildings connected by probable steam, above ground, pipelines; a steam/power plant; an electric substation; large cooling ponds/lagoons; support/administration building; and several disposal pits and/or trenches. There is a probable cooling water intake pumping station at the extreme north end of the site, on the bank of the Columbia River (Annotation A).

The pits described of the 1948 photo (Figure 3, Annotation A and C) are absent except for ground scarring (Annotations C). The pit at the north end of the site now appears as a trench, suggesting it has been partially filled in since 1948 (Figure 4, Annotation B).

There are several areas at this facility where waste disposal pits or trenches are observed. Adjacent to the previously mentioned pit/trench (Annotation B) there are two long trenches (Annotation D), a very wide pit surrounded by three spoil mounds is along the site's west perimeter (Annotation E), and a group of three small pits are at the southern portion of the site (Annotation F). No vehicles are visible discharging waste at any of these locations.

The facility also has several lagoons where liquids are handled, the largest stucture appears to be a cooling pond (Annotation G). There are three lagoons (Annotations H and J) and a pit (Annotation I) that appear to receive waste liquids.



INTERPRETATION CODE

BOUNDARIES AND LIMITS

- FENCED SITE BOUNDARY
- UNFENCED SITE BOUNDARY
- FENCE
- STUDY AREA

DRAINAGE

- DRAINAGE
- FLOW DIRECTION
- INDETERMINATE DRAINAGE

TRANSPORTATION/UTILITY

- VEHICLE ACCESS
- RAILWAY

SITE FEATURES

- DIKE
- STANDING LIQUID
- SL STANDING LIQUID
- EXCAVATION, PIT (EXTENSIVE)
- MOUNDED MATERIAL (EXTENSIVE)
- MM MOUNDED MATERIAL (SMALL)
- CR CRATES/BOXES
- DR DRUMS
- HT HORIZONTAL TANK
- PT PRESSURE TANK
- VT VERTICAL TANK
- CA CLEARED AREA
- DG DISTURBED GROUND
- FL FILL
- IM IMPOUNDMENT
- LG LAGOON
- OF OUTFALL
- SD SLUDGE
- ST STAIN
- SW SOLID WASTE
- TR TRENCH
- VS VEGETATION STRESS
- WD WASTE DISPOSAL AREA
- WL WETLAND

Figure 4. Rockwell Hanford Operations Area 100H, North May 25, 1948. Approximate scale 1:11,000.

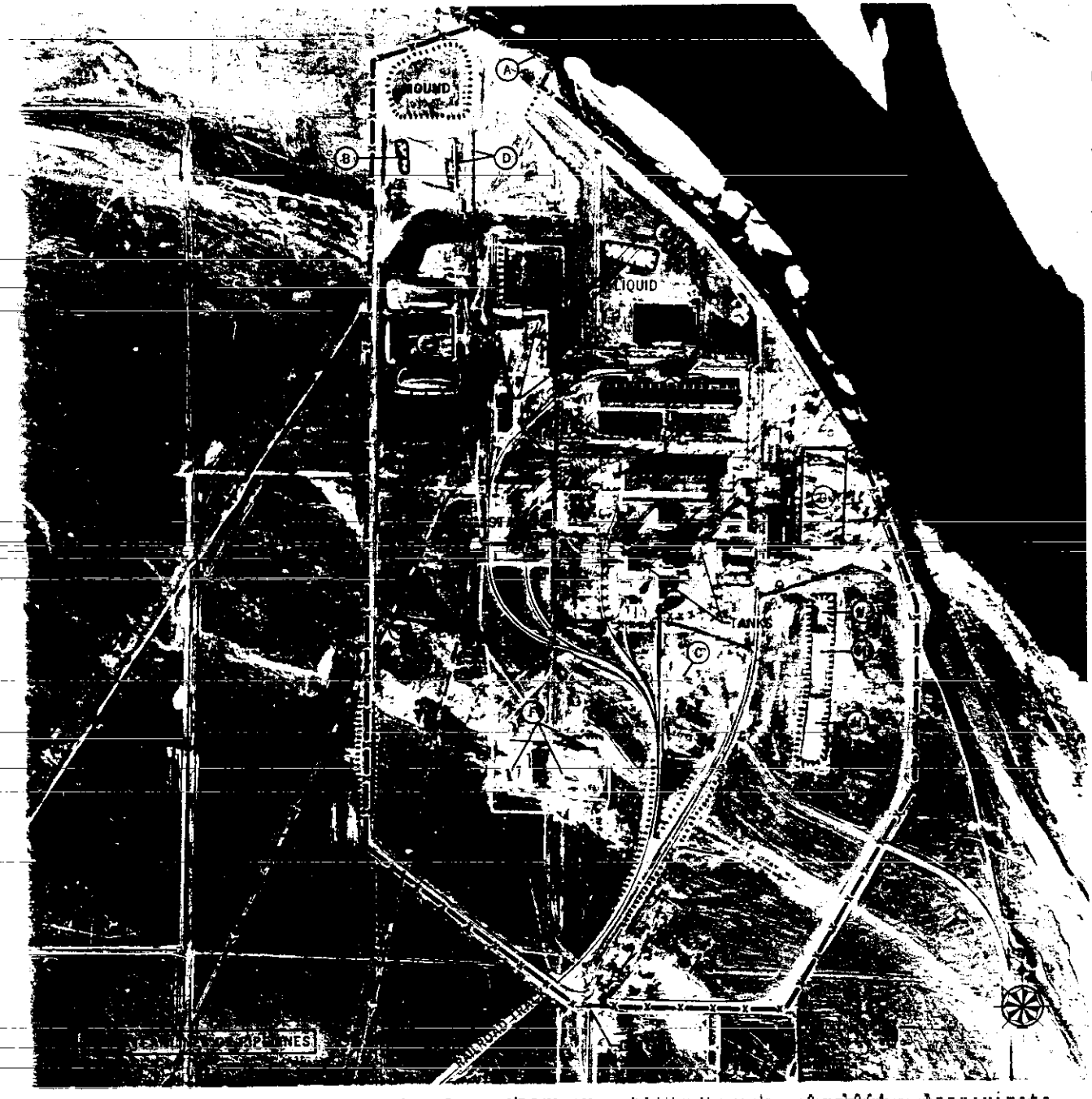


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Figure 5. Rockwell Hanford Operations Area 100H, November 2, 1964. Approximate scale 1:8,900.

AUGUST 1973

The 1973 photograph (Figure 6) suggests Area 100H is no longer operational and being dismantled. The steam/power plant has been dismantled (Annotation A), the support/administration buildings are removed (Annotation B), and the steam pipelines are disconnected.

The majority of disposal pits, trenches, and lagoons noted in 1964 have been covered up. The pit/trench at the north end of the site in 1964 (Figure 5, Annotation B) is absent (Annotation C). The trenches seen in the same northern area in 1964 (Figure 5, Annotation D) are also burried (Annotation D). The group of three small pits in 1964 (Figure 5, Annotation F) are covered over (Annotation F). The cooling pond is now empty (Annotation G) and the other lagoons and pit south of this cooling pond observed in 1964 (Figure 5, Annotations H and I) are absent (Annotations H and I). The other lagoons at the site are empty to suggest the facility is being shut down. Only the largest pit appears unchanged (Annotation E).

Figure 6. Rockwell Hanford Operations Area 100H, August 1973. Approximate scale 1:8,500.

AUGUST 1976

The 1976 photograph (Figure 7) reveals the dismantling of buildings and closure of Area 100H has continued since 1973. Additional buildings are removed and several remains/ruins of building foundations are visible (Annotations A). The three large lagoons in the northern portion of the facility are absent, only ground scars are discernable (Annotations B, C, and D). The large pit at the west perimeter of the sit has also been filled in, a depression remains at this location (Annotation E).

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Figure 7. Rockwell Hanford Operations Area 100H, August 1976. Approximate scale 1:7,500.

JUNE 16, 1982

The 1982 photograph (Figure 8) reveals continued dismantling of the facilities and closure of Area 100H. There is no visible indication of activity at the study site which now appears deserted. There is one large building remaining (Annotation A).

No visible waste disposal activity is noted.

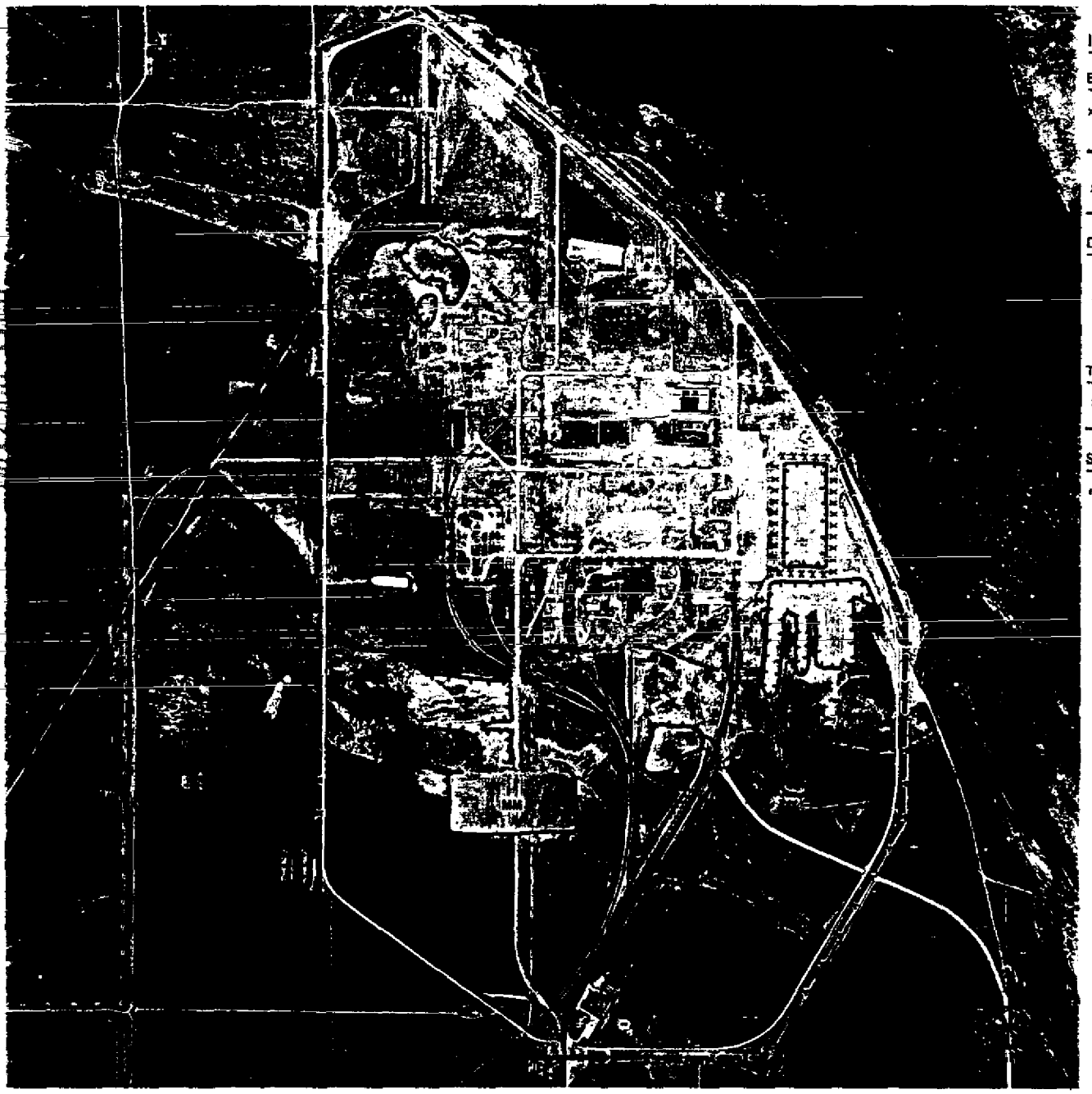

Figure 8. Rockwell Hanford Operations Area 100H, June 16, 1982. Approximate scale 1:8,500.